

the circuit formation surface of said semiconductor substrate, said trench having an upper end portion adjacent the circuit formation surface of the semiconductor substrate;

(c) oxidizing a trench portion formed in said semiconductor substrate, exposed in said trench;

G¹ (d) burying a buried insulating film into said trench so oxidized, said insulating film also being formed on the oxidation prevention film;

(e) after burying said buried insulating film, removing said insulating film on the oxidation prevention film, by chemical mechanical polishing, thereby forming a polished surface;

(f) after said removing, performing oxidation of said semiconductor substrate having said polished surface, so as to oxidize only a portion of said semiconductor substrate, at said upper end portion of the trench, and not substantially at other portions of the semiconductor substrate lining the trench, so as to provide a curvature of the upper end portion of the trench;

(g) eliminating said oxidation prevention film formed on said semiconductor substrate; and

(h) after said eliminating, forming a gate oxide film.

2. (Five Times Amended) A method of fabricating a semiconductor device comprising the steps of:

(a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate;

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- (b) forming shallow trenches having a radius of curvature at corners in a desired position of the circuit formation surface of said semiconductor substrate;
 - (c) forming trenches having a predetermined depth to said shallow trenches having a radius of curvature so formed;
 - (d) oxidizing trench portions formed in said semiconductor substrate, exposed in said trenches;
 - (e) burying a buried insulating film into said trenches so oxidized, with said insulating film being formed on said oxidation prevention film;
 - (f) removing said insulating film formed on said oxidation prevention film, by chemical mechanical polishing, thereby forming a polished surface;
 - (g) after said removing, performing oxidation of said semiconductor substrate having said polished surface, so as to oxidize only a portion of the semiconductor substrate extending from said corners, and not substantially at other portions of the semiconductor substrate lining the trenches, so as to increase the radius of curvature of the shallow trenches;
 - (h) eliminating said oxidation prevention film formed on said semiconductor substrate; and
 - (i) after said eliminating, forming a gate oxide film.
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4. (Five Times Amended) A method of fabricating a semiconductor device comprising the steps of:

- (a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate;

(b) forming trenches having a predetermined depth at desired positions of the circuit formation surface of said semiconductor substrate, said trenches having upper end portions not covered by said oxidation prevention film;

(c) oxidizing trench portions formed in said semiconductor substrate, exposed in said trenches;

G2 (d) burying a buried insulating film into said trenches so oxidized, said insulating film also being formed on said oxidation prevention film;

(e) removing said insulating film on said oxidation prevention film, by chemical mechanical polishing, thereby forming a polished surface;

(f) after said removing, performing oxidation of said semiconductor substrate having said polished surface, so as to oxidize only a portion of said semiconductor substrate at said upper end portions of said trenches, and not substantially at other portions of the semiconductor substrate lining the trenches, said upper end portions not covered by said oxidation prevention film being oxidized;

(g) removing said oxidation prevention film formed on the circuit formation surface of said semiconductor substrate; and

(h) after said oxidizing said semiconductor substrate, forming a gate oxide film.

5. (Five Times Amended) A method of fabricating a semiconductor substrate comprising the steps of:

(a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate;

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- (b) forming shallow trenches having a radius of curvature at corners in desired positions of the circuit formation surface of said semiconductor substrate;
 - (c) forming trenches having a predetermined depth in said shallow trenches having a radius of curvature;
 - (d) oxidizing trench portions formed in said semiconductor substrate, exposed in said trenches;
 - (e) burying a buried insulating film into said trenches so oxidized, said insulating film also being formed on said oxidation prevention film;
 - (f) removing said insulating film formed on said oxidation prevention film, by chemical mechanical polishing, thereby forming a polished surface;
 - (g) after said removing, performing oxidation of said semiconductor substrate having said polished surface, so as to oxidize only a portion of said semiconductor substrate extending from said corners, and not substantially at other portions of the semiconductor substrate lining the trenches, so as to increase the radius of curvature of the shallow trenches at said corners;
 - (h) removing said oxidation prevention film formed on the circuit formation surface of said semiconductor substrate; and
 - (i) after said oxidizing said semiconductor substrate, forming a gate oxide film.
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- G3*
9. (Five Times Amended) A method of fabricating a semiconductor device comprising the steps of:
- (a) forming an oxidation prevention film on a circuit formation surface of a

semiconductor substrate,

(b) forming trench regions in said substrate from said circuit formation surface thereof,

(c) performing a first oxidation to form an oxide film on said trench regions formed in step (b), and

(d) forming an insulating film inside said oxidized trench regions so as to completely fill them, thereby forming completely filled trench regions, and forming the insulating film on the oxidation prevention film,

characterized by further steps of:

(e) removing said insulating film formed on the oxidation prevention film, by chemical mechanical polishing, thereby forming a polished surface;

(f) after said removing, performing a second oxidation, of said semiconductor substrate having said polished surface, so as to selectively oxidize only an opening side of said completely filled trench regions in said substrate; and

(g) after performing the second oxidation, removing said oxidation prevention film, and forming a gate oxide film.

10. (Four Times Amended) A method of fabricating a semiconductor device comprising the steps of:

(a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate;

(b) forming a trench having a desired depth at a predetermined position of the circuit formation surface of said semiconductor substrate, the trench having an

upper end portion thereof extending to the circuit formation surface of the semiconductor substrate;

(c) oxidizing a trench portion formed in said semiconductor substrate, exposed in said trench;

(d) burying a buried insulating film into said trench so oxidized, the insulating film also being formed on the oxidation prevention film;

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(e) removing the insulating film formed on the oxidation prevention film, by chemical mechanical polishing, thereby forming a polished surface;

(f) after said removing, performing oxidation of said semiconductor substrate having said polished surface, so as to oxidize only a portion of the semiconductor substrate, at the upper end portion of said trench and not substantially at other portions of the semiconductor substrate lining the trench, to provide the upper end portion with a curvature;

and

(g) removing said oxidation prevention film formed on the circuit formation surface of said semiconductor substrate.

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15. (Four Times Amended) A method of fabricating a semiconductor device comprising the steps of:

(a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate;

(b) forming a trench having a desired depth at a predetermined position of the circuit formation surface of said semiconductor substrate, the trench having an

upper end portion thereof extending to the circuit formation surface of the semiconductor substrate;

(c) oxidizing a trench portion formed in said semiconductor substrate, exposed in said trench, so as to provide the upper end portion of said trench with a curvature;

G⁴ (d) burying a buried insulating film into said trench so oxidized, the insulating film also being formed on the oxidation prevention film;

(e) removing said insulating film formed on said oxidation prevention film, having said buried insulating film in said trench, by chemical mechanical polishing, thereby forming a polished surface;

(f) after said removing, performing thermal oxidation of said semiconductor substrate having said polished surface only at the upper end portion of the trench, to increase the curvature of the upper end portion of the trench as compared with the curvature provided in step (c); and

(g) removing said oxidation prevention film formed on the circuit formation surface of said circuit substrate.

41. (Twice Amended) A method of fabricating a semiconductor device comprising the steps of:

G⁵ (a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate;

(b) forming a trench having a desired depth at a predetermined position of the circuit formation surface of said semiconductor substrate, said trench having an

upper end portion adjacent the circuit formation surface of the semiconductor substrate;

(c) oxidizing a trench portion formed in said semiconductor substrate, exposed in said trench, forming a curvature of said upper end portion of said trench;

(d) burying a buried insulating film into said trench so oxidized, the insulating film also being formed on the oxidation prevention film;

(e) removing the insulating film formed on the oxidation prevention film, by chemical mechanical polishing, thereby forming a polished surface;

(f) after said removing, performing selective oxidation of said semiconductor substrate having said polished surface, at said upper end portion so as to provide an increased curvature of the upper end portion of the trench as compared with the curvature formed in step (c);

(g) eliminating said oxidation prevention film formed on said semiconductor substrate; and

(h) after said eliminating, forming a gate oxide film.

43. (Twice Amended) A method of fabricating a semiconductor device comprising the steps of:

(a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate;

(b) forming shallow trenches having a radius of curvature at corners in a desired position of the circuit formation surface of said semiconductor substrate;

(c) forming trenches having a predetermined depth to said shallow

trenches having a radius of curvature so formed;

(d) oxidizing trench portions formed in said semiconductor substrate, exposed in said trenches;

(e) burying a buried insulating film into said trenches so oxidized, said insulating film also being formed on the oxidation prevention film;

(f) removing said insulating film formed on the oxidation prevention film, by chemical mechanical polishing, thereby forming a polished surface;

(g) performing the selective oxidation of the semiconductor substrate having said polished surface, after said removing, so as to increase the radius of curvature at the corners of the shallow trenches as compared to the radius of curvature formed in step (b);

(h) eliminating said oxidation prevention film formed on said semiconductor substrate; and

(i) after said eliminating, forming a gate oxide film.

45. (Twice Amended) A method of fabricating a semiconductor device comprising the steps of:

(a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate;

(b) forming trenches having a predetermined depth at desired positions of the circuit formation surface of said semiconductor substrate, said trenches having upper end portions not covered by said oxidation prevention film;

(c) oxidizing trench portions formed in said semiconductor substrate,

exposed in said trenches, so as to provide a curvature at said upper end portions of the trenches;

(d) burying a buried insulating film into said trenches so oxidized, the insulating film also being formed on the oxidation prevention film;

(e) removing the insulating film on the oxidation prevention film, by chemical mechanical polishing, thereby forming a polished surface;

G1 (f) performing selective oxidation of said semiconductor substrate having said polished surface after said insulating film formed on said oxidation prevention film is removed, said upper end portions not covered by said oxidation prevention film being oxidized;

(g) removing said oxidation prevention film formed on the circuit formation surface of said semiconductor substrate; and

(h) after said oxidizing said semiconductor substrate, forming a gate oxide film.

46. (Twice Amended) A method of fabricating a semiconductor device comprising the steps of:

(a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate,

(b) forming trench regions in said substrate from said circuit formation surface thereof,

(c) performing a first oxidation to form an oxide film on said trench regions formed in step (b), so as to provide a curvature at an opening side of the trench

regions, and

(d) forming an insulating film inside said oxidized trench regions so as to completely fill them, the insulating film also being formed on the oxidation prevention film

characterized by further steps of:

(e) removing said insulating film formed on the oxidation prevention film, by chemical mechanical polishing, thereby forming a polished surface;

(f) after said removing, performing a selective second oxidation of said semiconductor substrate having said polished surface, to selectively oxidize the opening side of said completely filled trench regions in said substrate, so as to provide an increased curvature at the opening side as compared to said curvature provided in step (c); and

(g) after performing the second oxidation, removing said oxidation prevention film and forming a gate oxide film.

47. (Amended) A method of fabricating a semiconductor device comprising the steps of:

a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate;

(b) forming a trench having a desired depth at a predetermined position of the circuit formation surface of said semiconductor substrate, the trench having an upper end portion thereof extending to the circuit formation surface of the semiconductor substrate;

(c) oxidizing a trench portion formed in said semiconductor substrate, exposed in said trench, thereby providing the upper end portion of the trench with a radius of curvature;

(d) burying a buried insulating film into said trench so oxidized, said insulating film also being formed on the oxidation prevention film;

(e) removing said insulating film formed on the oxidation prevention film, by chemical mechanical polishing, thereby forming a polished surface;

(f) after said removing, providing the upper end portion of said trench with an increased radius of curvature, as compared with the radius of curvature provided in step (c), by performing selective oxidation of the upper end portion of the trench of said semiconductor substrate having the polished surface;

and

(g) removing said oxidation prevention film formed on the circuit formation surface of said semiconductor substrate.

Please add the following new claims to the application:

--54. A method of fabricating a semiconductor device comprising the steps of:

(a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate;

(b) forming a trench having a desired depth at a predetermined position of the circuit formation surface of said semiconductor substrate, said trench having an upper end portion adjacent the circuit formation surface of the semiconductor

substrate, said trench being formed by a first trench forming step, using isotropic etching, so as to form a radius of curvature in a proximity of the upper end portion, and by a second trench forming step using anisotropic etching;

(c) oxidizing a trench portion formed in said semiconductor substrate, exposed in said trench;

(d) burying a buried insulating film into said trench so oxidized, said insulating film also being formed on the oxidation prevention film;

(e) after burying said buried insulating film, performing an additional thermal oxidation so as to selectively oxidize the semiconductor substrate at said upper end portion of the trench;

(f) after burying said buried insulating film, removing said insulating film on the oxidation prevention film;

(g) eliminating said oxidation prevention film formed on said semiconductor substrate; and

(h) after said eliminating, forming a gate oxide film.

55. A method of fabricating a semiconductor device according to claim 54, wherein said further step of performing an additional thermal oxidation is performed after said removing step (f).
